Index

Index 1

Inherency Takeout 2

Timeframe Takeout (MUST READ) 3

Ozone Turn 4

Ozone Extension 5

Nuclear Reactor Turn 6

Inspiration – Short Term Takeout 7

Inspiration – Spinoffs Don’t Work 8

Inspiration – No Spinoffs 9

Inspiration – No Spinoffs 10

Inspiration – Kids Aren’t Inspired 11

GOTR – Self-Fulfilling Prophecy Turn 12

GOTR – A2: Asteroid 13

Solvency – Can’t Land 14

Solvency – Can’t Sustain Colony 15

Solvency – Colonization Fails 16

Solvency – Humans Can’t Travel 17

Solvency – Life Impossible 18

Solvency – Life Impossible 19

Solvency – Mars Direct Bad 20

Solvency – No Terraforming 21

Solvency – No Terraforming 22

Solvency – Zubrin is Stupid 23

Russia CP Solvency 24

Spending Link 25

Tradeoff Link (1/2) 26

Tradeoff Link (2/2) 27

Inherency Takeout

The Status Quo solves, NASA has overcome the greatest obstacle; funding.

Jacob, 2011

(By Jijo Jacob | February 11, 2011 11:44 AM EST. International business news. “Mars for sale! NASA draws up plan to 'colonize' red planet with corporate help”. <http://www.ibtimes.com/articles/111476/20110211/nasa-mars-colonization-red-planet-mission-space-one-way-corporate-sponsorship.htm>)

Researchers at NASA have drawn up a plan to make the greatest adventure in the history of the human race possible - sending a human mission to the red planet and, hold your breath, colonize it! And the daring act of "selling" and carving up the red planet will be made possible with the help of corporate bigwigs who will paint the space ships in their logo colors. NASA scientists have said in a research paper that corporate financing is the right way to support a $160-billion project to take human beings to Mars and start a colony there, according to space.com. Joel Levine, a senior research scientist at NASA Langley Research Center, calls is a "revolutionary business proposal" as it removes budgetary bottlenecks that have diluted the Mars mission's focus over the years. And there is more music to the ear: The researchers say the project will generate as many as 500,000 jobs in the U.S. over 10 years in aerospace and manufacturing sectors. The researchers discussed the plan in the book, "The Human Mission to Mars: Colonizing the Red Planet," which was published in December.

Timeframe Takeout (MUST READ)

Terraforming impossible. 100,000 years are needed to create an atmosphere inhabitable to humans.

Russell 05(Jenny, writer at New Scientist, 7/26, “Terraforming Mars”, lexis)

At least four main modifications to Mars will have to be performed if basic anaerobic plant life is to survive. The mean surface temperature must be such that water can exist in liquid form; the mass of the atmosphere must be increased; surface ultraviolet light and cosmic rays must be reduced to a safe level for life; and nitrogen, which is essential to all organisms, must be present. Creating Earth-like conditions that would enable humans to survive without any form of life-support system on the Red Planet will therefore be a very lengthy and complex process. Even using simple models of terraforming, it has been estimated that to create an atmosphere sufficiently rich in oxygen to allow human colonization of Mars will take in the order of 100,000 years. An extra difficulty to be overcome is the fact that Martian gravity is only about one-third that of the Earth, making any artificially created atmosphere harder to retain.

Bill Nye says Mars terraforming is not impossible, but a long ways off.

Nye, 06(Monterey County Herald (California) “MEET BILL NYE, SCIENCE GUY”, March 5, 2006)

As the celestial stars twinkled brightly outside California's Santa Anita Park, today's stars of science gathered inside to celebrate the 25th anniversary of the Planetary Society. Founded by the late Carl Sagan and other noted scientists, the Planetary Society promotes and teaches about space exploration. The Planetary Society recently held a dinner to honor movie director James Cameron, science-fiction legend Ray Bradbury and others. The master of ceremonies for the dinner was Bill Nye, who has won many Emmys, and served as host of such shows as "The 100 Greatest Discoveries," "The Eye of Nye" and "Bill Nye the Science Guy." At the dinner, Time For Kids kid reporter Sam Rubinroit had the opportunity to explore some of the wonders of science with Nye. Time for Kids: What do you think is the most exciting part of science? Nye: The most exciting part of science is the process, the way you go about discovering something. The joy of discovery is pretty worthy also. The process, that is to say, how you go about learning about the world is so compelling to me. TFK: How do you think schools can bring back a passion for science? Nye: I think the key of bringing science to school is with the teachers. When I look back at what I learned in school, it was the people presenting it that were the key. TFK: Through your shows, you mix comedy and science. How does comedy help children appreciate science? Nye: Comedy helps everybody pay attention, that's all. Comedy is fun, and you have to go into it. The old show, which I take it you watched, was primarily entertainment. Science was the reason we were doing it, but it has to be entertainment first or no one will sit through it. And comedy, what's more fun than comedy? TFK: How did you first get interested in science? Nye: I don't remember. It was before I was 3, and I used to watch bumblebees. I was fascinated, and I'd watch them, many times for hours. TFK: Why do you think space exploration is important for kids? Nye: It gives us a sense of how small our planet is in a way that nothing else does. They say that the most recognizable image to anyone on Earth is the image taken from Apollo 17 of the full Earth. The Earth is that blue ball, you see the clouds, you see Africa. They say that anywhere in the world people recognize that image. You wouldn't have that image without space exploration. And that image gives you an understanding of your place, like that's it, that's all you get! There's no getting off this planet, everybody lives here, everybody's got to get along, and you really get a sense of how important the ocean is, and how thin and fragile the atmosphere is. TFK: You say that the Earth is so fragile. Do you think one day we will inhabit other planets or maybe even stars? Nye: Will humans be on other worlds? You'd like to think yes. It's a long way off, and in the meantime, the notion of terraforming Mars is a pretty wild notion. We can barely take care of our own planet, let alone construct ecosystems on another one. So I'm not saying it's impossible, but it's a long way off. However, in the meantime, the exploration of these worlds is very important because they give us that global perspective, they give us an understanding of our world as a closed system. And if, we discover evidence of living things on Mars, that will change everything! TFK: Do you think there is other life? Nye: There's got to be. If there isn't other life somewhere in the universe, as the old saying goes, "It would be a quite a waste of space." There's got to be -- the chances of there not being are very, very slim. What I find so remarkable now is that it's very reasonable that there was life on Mars, and I sure would like to go find evidence of it in my lifetime. That would be fantastic. TFK: Do you think it is ethical to explore space when there is so much to be done here on Earth? Nye: A couple of things about that. First of all, as we say, any money spent on space is really spent on Earth. There are not a lot of people taking checks in space. The second thing is, if the choice were, let's say for example, help flood victims or explore Mars, well the answer would be easy, you'd help flood victims. But no, you have to do everything all at once. That's the idea. And what makes a society great is what it does with the resources it has available after it's taken care of everybody. We are a very wealthy society. Part of our legacy has to be these discoveries in outer space. TFK: There was a lot accomplished for the Apollo program because of competition during the Cold War. Can we accomplish as much in space with international cooperation? Nye: The answer is absolutely. What will motivate is in the future is the promise of discovery. International cooperation is essential because no one country has all the brains. We have to work together to accomplish more with less. TFK: How do you think manned exploration compares to robotic exploration? Nye: The thing about robot rovers is they don't need to eat, they don't need to sleep. They go up there, but they don't have any common sense. A geologist works considerably faster than a rover and makes many more discoveries in the amount of time he's there than a rover does. But, you have to get the geologist there, and get him back, and you have to feed him, and so on. So right now, Mars is so remote, and getting information back and forth is so difficult it is still right now better to send robots. But we all look to the day when we find some place on Mars that is worthy of sending humans there. And who knows what people will discover. Maybe that will be you. Sam Rubinroit, 13, is from Calabasas.

Ozone Turn

The plan requires massive space launches – that’s their zubrin evidence. That hurts the ozone – they create chlorine

Aftergood ’91 (Steven Aftergood, Senior Research Analyst at Federation of American Scientists, 9-7-1991, “Poisoned Plumes,” New Scientists, <http://space.newscientist.com/channel/space-tech/space-shuttle/mg13117854.400>) MG

More recently, concern about depletion of the ozone layer has stimulated renewed interest in the role played by exhaust from solid-rocket boosters. Ozone occurs naturally in the stratosphere, the layer of the atmosphere that begins at an altitude of between 8 and 16 kilometres, depending on latitude, and extends up to about 50 kilometres. The ozone layer absorbs the bands of ultraviolet radiation that can induce skin cancer and decrease photosynthesis in plants. Free chlorine atoms, released when hydrogen chloride from the exhaust reacts with naturally occurring hydroxyl radicals, constitute the principal danger to the ozone layer from rocket launches. The chlorine acts as a catalyst in the breakdown of ozone and, as a catalyst, it is not consumed by the reaction. It becomes part of a continuous cycle of destructive reactions that are still not fully understood. The cycles continue until the chlorine is trapped in a chemical or physical 'sink'. Hydrogen chloride itself is considered a temporary chemical sink for chlorine, but while the hydrogen chloride remains in the stratosphere, it is also a source of free chlorine. Physical sinks include aerosols, which adsorb chlorine and eventually diffuse out of the stratosphere.

Ozone depletion causes complete extinction – scientific consensus is on our side.

Greenpeace, ’95 (Full of Holes: Montreal Protocol and the Continuing Destruction of the Ozone Layer, <http://archive.greenpeace.org/ozone/holes/holebg.html>) MG

When chemists Sherwood Rowland and Mario Molina first postulated a link between chlorofluorocarbons and ozone layer depletion in 1974, the news was greeted with scepticism, but taken seriously nonetheless. The vast majority of credible scientists have since confirmed this hypothesis. The ozone layer around the Earth shields us all from harmful ultraviolet radiation from the sun. Without the ozone layer, life on earth would not exist. Exposure to increased levels of ultraviolet radiation can cause cataracts, skin cancer, and immune system suppression in humans as well as innumerable effects on other living systems. This is why Rowland's and Molina's theory was taken so seriously, so quickly - the stakes are literally the continuation of life on earth.

Ozone Extension

To many space launches destroys the ozone before we get off the rock.

By Lewis Page. 1st April 2009. Space launches could be capped to save ozone layer. http://www.theregister.co.uk/2009/04/01/space\_rockets\_kill\_ozone/print.html

American researchers have warned that space rockets could do more damage to the ozone layer than old-school spray-cans and fridges. "As the rocket launch market grows, so will ozone-destroying rocket emissions," said Professor Darin Toohey, atmosphere and ocean scientist at Colorado Uni. "If left unregulated, rocket launches by the year 2050 could result in more ozone destruction than was ever realized by CFCs."Chlorofluorocarbons (CFCs) were banned from use in aerosol cans, freezer refrigerants and air conditioners by the Montreal Protocol in 1987. Some scientists believe that the upper-atmosphere ozone layer - which protects the Earth's surface from harmful solar ultraviolet - will return to normal by 2040 as a result. But Toohey and his collaborators say the potential damage caused by rocket exhaust has been ignored. "The Montreal Protocol has left out the space industry, which could have been included," says the prof. Toohey's co-authors include Martin Ross of US government-funded R&D outfit The Aerospace Corporation. He, Toohey and the rest believe that more research is needed into the amount of ozone damage caused by different types of rockets. They argue that, should the ozone layer continue to deplete - or even fail to regenerate as expected - tough new regulations might outlaw the space industry.

Nuclear Reactor Turn

Their plan requires putting nuclear reactors in space

Day2006 (Dwayne, an American space historian and policy analyst and served as an investigator for the Columbia Accident Investigation Board. Day works for the Space Studies Board of the National Research Council/National Academy of Sciences, where he has served as a study director. He has written several books and articles in science magazines, He is a program officer at the Space Studies Board of the National Research Council, “Mars aboveground”, <http://www.thespacereview.com/article/677/1>) MG

What the film only touches upon is that many of Zubrin’s ideas have involved a fair degree of hand-waving (or should that be “waiving”?), usually in the form of assuming that because NASA did something once, decades ago, it should be relatively easy to do it again on a much bigger scale. NASA’s entry, descent and landing experts—the handful of people who have actually landed craft on Mars—admit that they do not know how they would land a 40 metric-ton vehicle (about 100 times heavier than the Mars rovers) on the surface of the planet. Heavy tethered, spinning spacecraft have not been flown successfully. Nor do we have the fully autonomous space-rated nuclear reactors that are essential to the Mars Direct scheme. It’s worth noting that all the nuclear reactors that we do have require substantial human tending, something that would not be possible with the time delay to Mars.

Means their rockets blow up – turns solvency and kills millions

Caldicott ’02 (Helen Caldicott, Australian physician, author, and anti-nuclear advocate who has founded several associations dedicated to opposing the use of depleted uranium munitions, nuclear weapons, nuclear weapons proliferation, war and military action in general “The New Nuclear Danger: George W. Bush's Military-Industrial Complex”) MG

The militarization of the s ace program has had a significant effect upon NASA’s nuclear commitment. One reason is that NASA insists on using nuclear power instead of solar power IS because the military Is enthusiastic about nuclear weapons in space. One recent NASA plutonium 238 space launch was the Cassini Saturn probe, which flew atop a Lockheed Martin Titan-4 military rocket. Cassini carried 27.3 pounds of plutonium 238-more plutonium than had ever been launched into space. The Titan-4 military rocket is an unreliable, dangerous old rocket with" a one-in-ten record - one catastrophic accident in every ten launches. Not long after the Cassini launch, three titan rockets blew up, either on the space pad or shortly after launching. NASA designed Cassini to circle Venus and then to return toward earth via a "gravity assist" slingshot in order to increase its momentum to Saturn. Cassini circled the earth above the atmosphere at 42,300 miles per hour, at an altitude of 700 miles on August '999. Luckily, unlike Apollo 13, the vectors were accurate, and Cassini with its, plutonium load did not enter the atmosphere to disintegrate and spread its deadly cargo across the planet. In its final environmental-impact statement, NASA said that if the flyby did not go as planned, and Cassini made an inadvertent reentry into the atmosphere, the plutonium 238 would have been re- released and "approximately five billion of the ... world population at the time .. could receive 99 percent or more of the radiation exposure.” NASA also acknowledged that if plutonium rained down on areas of natural vegetation, it might have to· "relocate animals"; if it fell\ on agricultural land, it might need to "'ban future a agricultural land uses"; and if it rained down upon urban areas it would have to “demolish all or some structures" and “relocate affected population permanently." Dr. Gofman of the University of California-Berkeley, - who is also the codiscoverer of uranium 235, predicted a death toll of 950,000 a result of a Cassini accident. 140-141

Inspiration – Short Term Takeout

Spin-offs come from government-funded projects, not just NASA

Fyfe 2009(Alonzo Fyfe, Tuesday, July 14, 2009, Internet Journalist with special emphasis on ethics, <http://bit.ly/pieQCv>)

A poor argument in defense of the space program has been the value of spin-offs**.** The American people acquired a lot of benefits from the technology that came from the Apollo project. The reason that this is a poor argument is because spin-offs are going to be spin-offs any time the government puts a lot of money into a project. An excellent example of this is war. Look at the spinoffs that came out of World War I and World War II. I am not talking about advances in military technology. I am talking about advances in technology that ended up providing benefits to the civilian population. A prime example of this are the advances in aeronautics that came out of the two world wars. World War I took aviation out of its infancy. World War II gave us the jet engine. We got better radar which went into the tracking storms. Military research gave us the microwave oven, the global positioning systm, and the internet. Even the space program itself is a spinoff of military research. Rockets were invented to deliver destruction behind enemy lines. This technology was then put to use putting a man on the moon. If the government were to spend $100 billion digging a hole from Los Angles to New York, that would produce spin-off benefits. This is not a special property of the space program that it produces side effects. Therefore, it is not a reason to recommend space development over any other potential use for $100 billion**....**If we look around us we find ourselves surrounded by benefits from all sorts of private expenditure – from newer and better search engines to cleaner ways of burning coal to new drugs to help fight disease. These benefits did not require a multi-billion dollar government project. It required private companies wanting to make a little money. So, the spin-off argument for the defense of space exploration is a bogus argument. It is one that a friend of reason will not use.

Inspiration – Spinoffs Don’t Work

Engineers produced from Mars exploration will not benefit the earth.

McCabe 05 (Department of Defense analyst, retired Lt. Col.Thomas R., “The Irrelevance of the Martian Frontier”, http://www.space.com/ adastra/050926\_mars\_irrelevant.html)

The Martian environment WILL demand ingenuity and adaptability. When we settle Mars, I expect it will undoubtedly produce some great engineers the problem is they will be Martian engineers. Will they be relevant to other environments? Old rule of thumb, don’t get an aerospace engineer to design a truck engine. You are liable to get a high performance engine that is extremely light and high-tech that uses exotic materials and fuels and is extremely expensive. Do you really want that in a truck engine? In this case, Martian engineers will be skilled at working at moderate low temperatures, non-oxygen low atmospheric pressures, in a mineral (especially iron) rich environment with frequent or pervasive permafrost. How relevant is this likely to be to the Moon or the asteroids? Engineers on the moon will face much more extreme temperatures, vacuum, with water lacking and minerals scarce. I suggest he drastically overestimates the potential of the Martian environment to nurture innovation. While Mars will demand innovation, there will likely be severe limits on what it can support. Innovation is likely to be tightly focused on immediate problems. There will be no social, economic, and environmental cushion for mistakes. One mistake can kill you all. On Earth, you could more or less walk away from Chernobyl and come back when the reactor stops glowing. Where exactly would you go on Mars? You can’t just climb on your horse and move over the next hill. This is not Kentucky in 1790 or the Ohio country in 1800-- Davy Crockett and Daniel Boone did not have to bring their air with them. By necessity, innovation is likely to be tightly monitored and controlled, for the simple reason that that they can’t waste resources or afford mistakes. Bottom line: the Martian frontier is irrelevant to the problems the US faces, and while it would be very nice to have, we don’t need it to thrive, let alone survive.

Inspiration – No Spinoffs

Mars will not foster innovation and discoveries will not benefit the Earth

McCabe 05 **-** Department of Defense analyst, retired lt. Col(Thomas R., “The Irrelevance of the Martian Frontier”, http://www.space.com/ adastra/050926\_mars\_irrelevant.html)

The challenges of settling Mars are relevant to problems on Earth. I suggest this is based on a massive misreading of the situation. The Martian environment WILL demand ingenuity and adaptability. When we settle Mars, I expect it will undoubtedly produce some great Engineers—the problem is they will be Martian engineers. Will they be relevant to other environments? Old rule of thumb—don’t get an aerospace engineer to design a truck engine. You are liable to get a high performance engine that is extremely light and high-tech that uses exotic materials and fuels and is extremely expensive. Do you really want that in a truck engine? In this case, Martian engineers will be skilled at working at moderate low temperatures, non-oxygen low atmospheric pressures, in a mineral (especially iron) rich environment with frequent or pervasive permafrost. How relevant is this likely to be to the Moon or the asteroids? Engineers on the moon will face much more extreme temperatures, vacuum, with water lacking and minerals scarce. I suggest he drastically overestimates the potential of the Martian environment to nurture innovation. While Mars will demand innovation, there will likely be severe limits on what it can support. Innovation is likely to be tightly focused on immediate problems There will be no social, economic, and environmental cushion for mistakes. One mistake can kill you all. On Earth, you could more or less walk away from Chernobyl and come back when the reactor stops glowing. Where exactly would you go on Mars? You can’t just climb on your horse and move over the next hill. This is not Kentucky in 1790 or the Ohio country in 1800-Davy Crockett and Daniel Boone did not have to bring their air with them. By necessity, innovation is likely to be tightly monitored and controlled, for the simple reason that that they can’t waste resources or afford mistakes. Bottom line: the Martian frontier is irrelevant to the problems the US faces, and while it would be very nice to have, we don’t need it to thrive, let alone survive.

Even if the space program brings back money in the generic, benefits of Mars exploration are not economic in nature.

David Collins 2008 (Boston University Journal of Science and Technology Law, “EFFICIENT ALLOCATION OF REAL PROPERTY RIGHTS ON THE PLANET MARS,” 7/25/11, http://www.bu.edu/law/central/jd/organizations/journals/scitech/volume142 /Documents/Collins.pdf)EH

A Mars expedition will be undertaken when the expected benefit exceeds the cost. However, the fact that NASA and other agencies have already expended resources in Mars’ exploration without economic gain illustrates that most, if not all, of the benefits derived from space exploration so far are nonmarket benefits, like the advancement of scientific knowledge and the satisfaction of curiosity. Similarly, a significant component of the cost of manned space exploration is the risk of human safety, which also cannot be readily quantified for the purposes of cost-benefit assessment. While the expense of a manned Mars mission would be much higher than the robotic missions to date, one might expect that such costs and human risks will decline over time because of corresponding increases in technology. The expected gains from a Mars expedition should also increase over time because technology should augment the extent and quality of knowledge that can be gained from such missions. Also, technology should enhance the degree to which the planet can be developed profitably, for example, with improved methods of transforming deuterium ice into a ready energy supply. Thus, the initial missions emerge as the least efficient from a cost-benefit perspective. Yet, property law suggests that the initial missions are the most important for the purpose of establishing a claim, although this may depend upon what activities count as possessory.

Inspiration – No Spinoffs

Mars Voyage has major costs with no financial or developmental return.

Paul, 7-21-2011 (Gregory, an independent researcher whose research has appeared in Newsweek, USA Today, The Guardian, London Times, LA Times, MSNBC, FoxNews. “The Death of Human Space Flight.” July 21, 2011. <http://www.opednews.com/articles/The-Death-of-Human-Space-F-by-Gregory-Paul-110721-407.html>)

Getting to the surface of Mars will combine intense danger with fantastic cost with not the slightest hope of financial return. The risk to the voyagers is not entirely physical. Think it over. What are humans advised to do? Spend lots of time outdoors, breath the fresh air, connect with nature, go for hikes and the like. It is integral to human psychology. A Mars voyage involves detaching humans from their normal habitat and placing them in a chronic stress inducing extraterrestrial situation for a couple of years during which they are always ensconced in artificial spaces or suits, and returning to the safety of our planet is always months away. Chances of killing or at least damaging some of or all the crew are excellent. The new notion of sending old folks to Mars with the intent of never getting them back is so ethically and practically dubious in so many ways that it shows just how desperate and detached from reality and ethics the Mars cult is becoming. And it is a hook intended to force continual Mars voyages -- we could hardly let a bunch of seniors get to Mars and let them die off until one succumbs alone. We would be committed to Mars exploration for the long term even if we later decide it was a budget breaking bad idea.

Inspiration – Kids Aren’t Inspired

No inspiration

Dinkin2004—CEO of Spaceshot, PhD (Sam, 7 September 2004, Colonize the Moon before Mars, <http://www.thespacereview.com/article/221/1>,)

Robert Zubrin constantly beats the drum for exploring Mars first. It is disingenuous to say that the goal of space exploration is the colonization of Mars. Even colonization advocates would be happy with colonization of the Moon, the asteroids, and many other destinations. The discovery of life on Mars would not matter much one way or the other. Suppose there is Earth-like life on Mars. That might point to a common origin or a similar bootstrap method. What is that worth commercially? If you knew the answer, how much could you sell it for? Ten billion? What follow on activities would that news generate? **None**. Life may be an exciting discovery perhaps the most exciting in all history, but it does not amount to a large inducement to go to Mars.

GOTR – Self-Fulfilling Prophecy Turn

Colonizing other planets is a self-fulfilling prophecy that makes extinction inevitable

Williams 2010(Lynda, Physics Instructor, “Irrational Dreams of Space Colonization”, Peace Review, a Journal of Social Justice, <http://www.scientainment.com/lwilliams_peacereview.pdf>) AJ

Life on Earth is more urgently threatened by the destruction of the biosphere and its life sustaining habitat due environmental catastrophes such as climate change, ocean acidification, disruption of the food chain, bio-warfare, nuclear war, nuclear winter, and myriads of other man-made doomsday prophesies. If we accept these threats as inevitabilities on par with real astronomical dangers and divert our natural, intellectual, political and technological resources from solving these problems into escaping them, will we playing into a self- fulfilling prophesy of our own planetary doom? Seeking space based solutions to our Earthly problems may indeed exacerbate the planetary threats we face. This is the core of the ethical dilemma posed by space colonization: should we put our recourses and bets on developing human colonies on other worlds to survive natural and man-made catastrophes or should we focus all of our energies on solving the problems that create these threats on Earth?

GOTR – A2: Asteroid

Asteroids aren’t a threat- not probable

Thomas Hart, journalist, copywriter and content specialist, 2/8/2011 [“NASA: Russian claims of Apophis collision with Earth exaggerated”, February 8th, 2011, http://personalmoneystore.com/moneyblog/2011/02/08/apophis-collision-with-earth/]

Apophis is the “doomsday asteroid” that Russian astronomers predict will collide with Earth in 2036. The Russians said when Apophis makes a routine pass close to Earth in 2029, it could fly through a “gravitational keyhole” that will put it on a collision course in a later orbit. NASA dismissed the probability of an Apophis/Earth collision, but it is working on methods to deflect doomsday asteroids. Odds of Apophis collision course slim The chance of an Apophis collision with Earth was first announced by NASA scientists in 2004. Initial observations hinted that Apophis, about the size of a cruise ship, could collide with Earth in 2029. A deeper mathematical investigation of the probabilities virtually ruled out any chance of an Apophis/Earth collision. Last month Russian astronomers said that during its 2029 fly-by, Apophis could pass through a pinpoint in space known as a gravitational keyhole that would alter its course enough to hit the bullseye in 2036. A NASA official didn’t deny the Russian claims but noted that the odds of Apophis passing through the gravitational keyhole are one in 250,000.

Solvency – Can’t Land

We can’t land the equipment necessary to colonize on mars

Atkinson 7(Nancy Atkinson, Nancy is also a NASA/JPL Solar System Ambassador, science journalist who writes mainly about space exploration and astronomy, <http://www.universetoday.com/7024/the-mars-landing-approach-getting-large-payloads-to-the-surface-of-the-red-planet/>)

The real problem is the combination of Mars’ atmosphere and the size of spacecraft needed for human missions. So far, our robotic spacecraft have been small enough to enable at least some success in reaching the surface safely. But while the Apollo lunar lander weighed approximately 10 metric tons, a human mission to Mars will require three to six times that mass, given the restraints of staying on the planet for a year. Landing a payload that heavy on Mars is currently impossible, using our existing capabilities. “There’s too much atmosphere on Mars to land heavy vehicles like we do on the moon, using propulsive technology completely,” said Manning, “and there’s too little atmosphere to land like we do on Earth. So, it’s in this ugly, grey zone.”

Solvency – Can’t Sustain Colony

Earth doesn’t have the resources to support colonies on Mars in the long term

Kazan 09(Casey, Galaxy Editorial staff, “Will Orbiting Space Colonies Replace Planets?”, lexis)

There are many largely unaddressed questions, both moral and practical that have not been presented alongside the space colonization platform. Its called œreality and its not nearly as rosy as the dream. Astrophysicists and cosmologists around the globe seem to be in agreement that life on Earth is fragile and bereft with risks. Scientists like Dr. J. Richard Gott, a professor of astrophysics at Princeton who says we should get a colony up and running on Mars within 46 years, and men like Stephen Hawking, who is a well known space colonizationadvocate, may be absolutely right about the risks, but are they right about the solution? Then there is the other argument”that we dont even need a planet at all. Dave Brody of the National Space Society says œorbiting colonies are the way to go. "Just because you evolved on a planet does not necessitate that you continue to live on one. And there are some profoundly good reasons not to do so. Like that big honkin' ˜gravity well that you have to expensively and dangerously blast your way up out of each time you need to go someplace. And the bigger the planet, the worse the penalty." Maybe Brody is onto something, but the same logic can be applied to this idea as to colonizing Mars”long-term sustainability with no parent planet with vast resources to send reinforcements makes the likelihood of this being a long-term solution quite slim. Also, with both of these plans there would have to be some serious population control. A really interesting aspect of colonization will be whether we can really get over ourselves enough to do it properly - or whether our existing stupidities will be enough to stop it. Once the Moon and Mars open up it could be the New World, Australia and most of human history all over again - though this time without the inconvenient natives.

Solvency – Colonization Fails

It’ll be at least 200 years before Mars is colonized and even that fails unless we go to the moon first – plan doesn’t solve

Anderson08 (Gregory, a freelance writer and a client of the Virginia Kidd Literary Agency, December 24, “Mars, 2200 AD?”, lexis)

Dec. 24, 2008 ([The Way Out](http://thewayoutspace.blogspot.com/) delivered by Newstex) -- The History Channel series, The Universe, featured a program about the early colonization of Mars last evening, setting the time frame for colonization at the dawn of the twenty-third century. Alas, that premise promised more than the show even attempted to deliver.Perhaps the biggest logical flaw of the program was that it approached the technology of the colony by showing technology being developed today. That's roughly similar to trying to extrapolate early lunar exploration from technology used by Lewis and Clark. The result was aMars colony that would not attract many colonists-- cramped, sterile, and constantly on the brink of disaster. Good drama for a documentary, but bad in reality. The program totally ignored the political and cultural underpinnings of such a project, and threw in an economic rationale-- rather curiously, mining asteroids-- largely as an afterthought.If humanity establishes a colony on Mars by 2200, or before, it will be after decades of successfully, and prosperously, living on the Moon. A lunar political entity might be independent by then. There could well be space cities in their own orbits, home to tens of thousands of people, pursuing businesses and science that could not be done on Earth-- a vastly more wealthy civilization than we have today. A Mars colony probably would deal in asteroid mining, but the main driver of its economy would be the utilization of Martian resoures. With so much experience living beyond Earth, the first Mars colony would be relatively safe, prosperous, comfortable, and connected via a descendant of the Internet to the throbbing human civilization Sunward.

Solvency – Humans Can’t Travel

Cosmic rays prevent Mars mission in the status quo

**Choi ’08** (Charles, March 31, writer for Columbia Missourian, Master of Journalism from University of Missouri-Columbia with an emphasis on Space Journalism, “Space Radiation Too Deadly for Mars Mission”, <http://www.space.com/5190-space-radiation-deadly-mars-mission.html> DOA: 7/25/11 ARW)

Astronauts have long seen white flashes while in space due to cosmic rays, or extremely high-energy particles, passing through their heads. A return to the moon or a mission to Mars that NASA and other space agencies are planning would place astronauts at continued risk from cosmic rays or dangerous bursts of solar radiation. Several reports in the past have outlined the potential risks. To further investigate the risks that space radiation currently pose, the National Research Council assembled experts in space and biology together. At the present time, given current knowledge, the level of radiation astronauts would encounter "would not allow a human crew to undertake a Mars mission and might also seriously limit long-term Moon activity," this committee notes in their new report today. **Uncertainties remain** Still, much remains uncertain regarding the actual risks that space radiation poses for the body, explained committee member Walter Schimmerling, a scientist now retired from NASA's space radiation program. All these uncertainties mean that [safety](http://www.space.com/5190-space-radiation-deadly-mars-mission.html) margins have to remain high, limiting how long astronauts can stay in space. This in turn could rule out a mission to Mars, as well as long-term or multiple missions to the moon.

"The way to deal with that problem is to reduce the margins of uncertainty," Schimmerling told SPACE.com.

A trip to Mars cannot be survived by humans.

Lynda Williams 2010, (Physics Professor Santa Rosa Junior College, “Irrational Dreams of Space Colonization,” 7/25/11, http://www.scientainment.com/lwilliams\_peacereview.pdf)

A Moon base is envisioned as serving as a launch pad for Martian expeditions, so the infeasibility of a lunar base may prohibit trips to Mars, unless they are launched directly from Earth. Mars is, in its closest approach, 36 million miles from Earth and would require a nine-month journey with astronauts exposed to deadly solar cosmic rays. Providing sufficient shielding would require a spacecraft that weighs so much it becomes prohibitive to carry enough fuel for a roundtrip. Either the astronauts get exposed to lethal doses on a roundtrip, or they make a safe one-way journey and never return. Either way, no one can survive a trip to Mars and whether or not people are willing to make that sacrifice for the sake of scientific exploration, human missions to Mars do not guarantee the survival of the species, but rather, only the death of any member who attempts the journey.

Solvency – Life Impossible

Life on Mars impossible. Lack of previous life, necessary gases, and water. No ability to create necessary gases.

Gilbert V. Levin, 1997, (Biospherics' President and CEO of SPHERIX, NASA’s Mars exploration program, “The Viking Labeled Release Experiment and Life on Mars,” 7/25/11, http://mars.spherix.com/spie/spiehtml.htm)EH

1. No organic compounds were found in martian soil analyzed by the Viking Gas Chromatograph Mass Spectrometer (GCMS). 2. H2O2 , chemically formed in the upper atmosphere, was thought to descend to the soil and, directly or through forming complexes or compounds, to oxidize the LR substrates to evolve labeled gas. 3. It was assumed that there is no liquid water on Mars, and that its absence would make life impossible; and, as a corollary, the overall environment was believed too extreme to support life. 4. The amplitude and kinetics of the LR response from Mars was thought to be "too much too soon" for any putative martian biology. 5. Although not a pre-mission criterion for life, a second injection of LR nutrient onto positive samples failed to re-invigorate the evolution of gas, as generally occurs with terrestrial soils. Instead, some of the gas evolved after the first injection appeared to be reabsorbed into the soil. 6. No visual evidence for life was reported when the Viking camera images were examined. 7. UV light from the sun was thought to activate soil particles, which then disrupted the LR nutrient upon contact, releasing labeled gas. Also, UV light's destructive effect was held to account for the reported lack of any organic matter on Mars. 8. Clays on Mars were proposed to react with the LR nutrient to release labeled gas. 9. A non-biological explanation of the Mars LR response seemed far simpler than proposing a separate origin of life on Mars. Application of Ockham's Razor, therefore, indicated chemistry or physics over biology.

No Life can exist on Mars. We don’t have the technology to overcome challenges.

Lynda Williams 2010, (Physics Professor Santa Rosa Junior College, “Irrational Dreams of Space Colonization,” 7/25/11, http://www.scientainment.com/lwilliams\_peacereview.pdf)

What do the prospects of colonies or bases on the Moon and Mars offer? Both the Moon and Mars host extreme environments that are uninhabitable to humans without very sophisticated technological life supporting systems beyond any that are feasible now or will be available in the near future. Both bodies are subjected to deadly levels of solar radiation and are void of atmospheres that could sustain oxygen-based life forms such as humans. Terra- forming either body is not feasible with current technologies or within any reasonable time frames so any colony or base would be restricted to living in space capsules or trailer park like structures which could not support a sufficient number of humans to perpetuate and sustain the species in any long term manner.

Solvency – Life Impossible

**We can’t live on mars, atmosphere makes it incredibly difficult.**

**Norweign, Space Center**. "Can We Live on Mars?" **2003.** Web. 25 July 2011.

Mars is poorly suited for human habitation. There’s some ice at the poles and perhaps some water in underground repositories. Gravity is only 38 percent as strong as on Earth. The atmosphere is thin and consists mostly of carbon dioxide (95%). So colonists would have to either take air from Earth or make air on Mars. Plants efficiently separate the oxygen bound to carbon and therefore can make air we can breathe, so colonists should take plants along.The Martian atmosphere is too thin to hold oxygen, which would just escape to space. So the plants would have to be cultivated in greenhouses and the oxygen they produce kept in flasks.Mars has a very weak magnetic field, and its atmosphere offers little protection against radiation from space. So the Martian colonists would have to build radiation protection into their houses and wear thick suits. Unlike Earth, where most incoming meteorites burn up in the atmosphere, many meteorites crash dangerously onto the surface of Mars.

**Martian weather makes life on Mars impossible**

**Norweign, Space Center**. "Can We Live on Mars?" **2003.** Web. 25 July 2011.

The Martian weather is awful. It’s cold: the average temperature of the southern hemisphere is minus 60 degrees Celsius; even at the equator, it’s seldom over zero. Winds are fierce and blow at speeds of several hundred kilometres an hour, and storms can last for months. The wind whirls up fine dust that penetrates everything and sticks to all surfaces, which literally would toss sand in the gears of vital mechanical and electronic equipment. Today, there are no concrete, approved plans for sending people to Mars. The earliest date mentioned in official papers is 2019, which would be 50 years after the first Moon landing.

Solvency – Mars Direct Bad

Zubrin’s a hack – his math is terrible and Mars Direct will fail

Day2006 (Dwayne, an American space historian and policy analyst and served as an investigator for the Columbia Accident Investigation Board. Day works for the Space Studies Board of the National Research Council/National Academy of Sciences, where he has served as a study director. He has written several books and articles in science magazines, He is a program officer at the Space Studies Board of the National Research Council, “Mars aboveground”, <http://www.thespacereview.com/article/677/1>) MG

Although the film is clearly sympathetic to Zubrin and his ideas, to filmmaker Gill’s credit he also interviewed people at NASA who splashed some cold water on Zubrin’s early claims, even while they acknowledged that the core concept was sound. When they actually started crunching the numbers on the Mars Direct proposal they found a number of flaws. For instance, Zubrin’s team had apparently dramatically underestimated the amount of water and food that a crew would need on such a long journey—they’d die of starvation, assuming that they did not die of dehydration first. They also found Zubrin’s launch mass numbers to be too low, and his proposal for a four-man crew was also too small, especially for a very long surface stay. One might suspect that this is a typical bureaucratic not-invented-here reaction, but the people saying this were actually the enthusiasts within the space agency. It is also hard to argue about proper crew size and water requirements with the only people who actually put humans into space on a regular basis. One NASA official commented—with barely-hidden snarkiness—that although it is easy to propose theoretical human spaceflight missions, the people who actually have to make the nuts and bolts fit together have found them to be much harder to do.

The tech isn’t available for Mars Direct

Day2006 (Dwayne, an American space historian and policy analyst and served as an investigator for the Columbia Accident Investigation Board. Day works for the Space Studies Board of the National Research Council/National Academy of Sciences, where he has served as a study director. He has written several books and articles in science magazines, He is a program officer at the Space Studies Board of the National Research Council, “Mars aboveground”, <http://www.thespacereview.com/article/677/1>) MG

What the film only touches upon is that many of Zubrin’s ideas have involved a fair degree of hand-waving (or should that be “waiving”?), usually in the form of assuming that because NASA did something once, decades ago, it should be relatively easy to do it again on a much bigger scale. NASA’s entry, descent and landing experts—the handful of people who have actually landed craft on Mars—admit that they do not know how they would land a 40 metric-ton vehicle (about 100 times heavier than the Mars rovers) on the surface of the planet. Heavy tethered, spinning spacecraft have not been flown successfully. Nor do we have the fully autonomous space-rated nuclear reactors that are essential to the Mars Direct scheme. It’s worth noting that all the nuclear reactors that we do have require substantial human tending, something that would not be possible with the time delay to Mars.

Solvency – No Terraforming

Mars is lifeless and all its resources are in forms inaccessible for use – terraforming would take at least 100,000 years

Hawkes92(Nigel, writer at The London Times, The London times, January 25, “Planet X marks the spot”, lexis)

The new knowledge has, it is true, left some attractive theories in the dustbin. A hundred years ago Percival Lowell, the American, convinced himself that Mars was crossed by a network of canals, running from icy poles into the arid equatorial regions. He imagined that these waterways had been created by intelligent beings to supply fresh water. In fact, his canals were an illusion created by the eye's ability to link up unrelated details to give the impression of lines. Satellite surveys of the Martian surface showed none of Lowell's canals; Mars was apparently as silent and lifeless as the Moon. This disappointment has, however, stimulated a group from the Ames Research Centre of Nasa, the US space agency, which argues that Mars has virtually all that is necessary for life water, carbon dioxide and nitrogen but in forms that are as yet inaccessible because of the frigid temperatures of the planet. The scientists have devised a way of making it habitable, first for plants and later for human beings. The ''terraforming'' of Mars and its colonisation would be no quick fix; it might take 100,000 years.

Terraforming Mars fails – takes too long and all proposed methods have major flaws.

Russell 05(Jenny, writer at New Scientist, November 5, “Terraforming Mars”, lexis)

I fear that Mike Martinez's idea of diverting comets to Mars in order to speed up the process of terraforming is a complete non-starter as a means of colonisation (15 October, p 23). A great deal more than water will be needed to achieve even the first stage of terraforming, which is ecopoeisis - the creation of a self-sustaining biosphere. At least four main modifications to Mars will have to be performed if basic anaerobic plant life is to survive. The mean surface temperature must be such that water can exist in liquid form; the mass of the atmosphere must be increased; surface ultraviolet light and cosmic rays must be reduced to a safe level for life; and nitrogen, which is essential to all organisms, must be present. Creating Earth-like conditions that would enable humans to survive without any form of life-support system on the Red Planet will therefore be a very lengthy and complex process. Even using simple models of terraforming, it has been estimated that to create an atmosphere sufficiently rich in oxygen to allow human colonisation of Mars will take in the order of 100,000 years. An extra difficulty to be overcome is the fact that Martian gravity is only about one-third that of the Earth, making any artificially created atmosphere harder to retain. When conditions on Mars are such that water can exist on the surface in liquid form, there will probably be no need to import it from comets anyway, since it is thought the inventory of water locked up in the planet's permafrost and polar regions will be adequate to meet the needs of the first human beings to colonise the planet. However, as an astrobiologist, I would need to be assured that there is no extant life on Mars before even beginning the processes of terraforming - human beings, thus far, have a pretty poor record of looking after their home planet, so any life forms on Mars would stand little chance of survival once Homo sapiens arrived. Perhaps we should concentrate on putting our own planet in order before it is too late, and certainly before we start deliberating on how best to colonise another one. *From Steuart Campbell* Martinez suggests terraforming Mars by dumping comets into its atmosphere. All very well, but this does not produce a breathable atmosphere. N. N. Semenov (1975) proposed electrolysis of Martian water to obtain oxygen (time required: between one and four centuries). However, how to get rid of the hydrogen produced by electrolysis remains a problem. Freeman Dyson (1979) suggested mining one of Saturn's moons, Enceladus, for its water-ice and returning the material to Mars as hydrogen and water (more electrolysis?).

Solvency – No Terraforming

Terraforming impossible – no way to initiate photosynthesis, even if there were, other obstacles remain.

Hawkes92(Nigel, writer at The London Times, The London times, January 25, “Planet X marks the spot”, lexis)

The next step, McKay admits, is even harder. There seems no simple way in which the carbon dioxide could be converted into oxygen, except by the process of photosynthesis which carries out the same process on Earth. Assuming plants like lichens, mosses and algae could be established, it could take them 100,000 years to create enough oxygen for human beings to strut the Martian surface without the aid of breathing apparatus. Even that would be impossible if there were not sufficient inert gases on Mars to provide an atmospheric buffer and prevent spontaneous combustion. On Earth this role is taken by nitrogen, which also seems the best Martian candidate. The entire project depends on how much of its volatile materials, including nitrogen and water, Mars has retained. The solar system most likely began as a mass of elements whirling around the Sun in a flat, disc-like solar nebula. As the planets began to condense out of the disc, those closest to the Sun consisted mostly of the heavier elements, such as silicon and iron, while those furthest away were made up of lighter elements Jupiter consists principally of hydrogen and helium. Mars lies outside the orbit of Earth, so on this basis should have a greater proportion of volatiles. But if, as some astronomers believe, the volatiles Mars once possessed have all disappeared because its gravity is too small to hold them, then there is nothing to be done.

Solvency – Zubrin is Stupid

Zubrin is a hack – the tech doesn’t exist and humans won’t survive

Bell ’05 (Jeffrey F. Bell is a former space scientist and recovering pro-space activist, “The Dream Palace Of The Space Cadets”, Nov 24, <http://www.spacedaily.com/news/oped-05zzb.html>) MG

Unfortunately, the new generation of organizations like the Space Frontier Foundation and the Mars Society and even the staid National Space Society mostly lack something that the old L-5 Society and Space Studies Institute had: technical sophistication. Just look at Bob Zubrin's vision of Mars colonization. Nowhere in Zubrin's books is there the kind of detailed engineering design for Mars colonies that the O'Neillians produced for their L-5 colonies. The problems of sustaining human life on Mars are dismissed after superficial discussions devoid of any hard numbers. And there are obvious problems with colonizing Mars. The first one is that it gets incredibly cold there - probably down to -130C on winter nights. Every robot Mars probe has used small slugs of Pu-238 to keep its batteries from freezing at night. And there is air on Mars - not enough to breathe, but enough to conduct heat. The Martian regolith will not be the perfect insulator that the Moon's is. Thermal control on Mars will not be simply a matter of adding layers of aluminum foil to reflect the sun. Bases and rovers will need to be insulated and heated. And how do you keep a human in a spacesuit warm in this climate? And Mars has permafrost - at least in some places and those places are the ones to colonize. How do we keep the heat leaking out from our habitat or farm greenhouse into the ground from heating up the ice and melting or subliming it away? This is a severe problem in permafrost areas of the Earth - how bad will it be on Mars? Zubrin even proposes underground habitats. These will be in direct contact with the cold subsoil or bedrock which will suck heat out at a rapid rate. If Gerard O'Neill was still alive and advocating Mars colonies, he would be doing some basic thermal transfer calculations to see how bad the Martian cold problem really is. He would be figuring out how big a fission reactor to send along to keep the colony warm and how often its core will need to be replenished by fresh U-235 from Earth. He would even have a rough number for the amount of Pu-238 everyone will have to carry in their spacesuit backpacks. Bob Zubrin is perfectly competent to do these calculations since he has a Ph.D. in nuclear engineering. But you never see this kind of hard engineering analysis from the Mars Society. Instead, we get propaganda stunts like the Devon Island "Mars Base" which is only manned during the peak of the Arctic summer when the climate is tropical compared with that of Mars. Another thing you never see from the Mars Society is a realistic discussion of what would happen to the human body in the low Martian gravity. Zubrin has discussed at length the need for artificial spin gravity on the 6 month trip to Mars. But he assumes that the problem ends once the astronauts land on Mars. The problem of bone loss in a 0.38g field on Mars for 18 months is completely ignored. When I read Zubrin's book The Case For Mars, I was so intrigued by this surprising omission that I consulted a friend who is a space medic at JSC. He tells me that this issue was once discussed at a conference of medical doctors who had actually worked with the long-term residents of Mir and ISS. NONE of these experts thought that humans could adapt permanently to Mars gravity!

Russia CP Solvency

Russia can get to Mars—Chinese funding solves all constraints

Seedhouse2009(Erik, aerospace scientist and manned spaceflight consultant, Martian Outpost, p. 19)

Despite the various hardships the Russian space program has endured since the dissolution of the Soviet Union, there are still many who dream of going to Mars. The S.P. Korolev Rocket and Space Corporation, also known as Energiya, even has a website devoted to a proposed manned Mars mission, despite the reality that the era of independent Russian interplanetary exploration is over, at least for the time being. Russia has wanted to go to Mars since the late 1960s, once it became clear the race to the Moon was lost. Since losing out to the Americans, the Russians switched their focus to long-duration space flight, continuing to man the Mir space station until it was de-orbited in 2001. During the Mir era. the Russians gained invaluable experience in supporting extended-duration missions, some of which lasted more than a year. In fact, the record for the longest spaceflight ever is held by Russian cosmonaut, Valery Polyakov (Figure 2.2), who spent four hundred and thirty seven days in orbit between January 8, 1994, and March 22. 1995. Since the de-orbiting of Mir, manned Mars missions have been the subject of talk and little else, although Nikolai Sevastyanov, ex-president of Energiya, optimisti­cally believes a manned Mars project could be achieved after 2025. Consisting of three stages, the Russian route to Mars would begin with a trial expedition around the Moon, followed by a non-landing manned expedition to Mars and. finally, a manned Mars landing. Unfortunately, despite the regular announcements in the press of impending Mars missions, the reality is the Russian space agency probably couldn't afford such an endeavor. Although Russians hope to set foot on Mars, it is likely this goal will only be achieved with the cooperation of other space agencies. Such cooperation may be with ESA or NASA but it may also be with either India or China, each of which has been involved in discussions with the Russians. In September. 2007. Russia and India held discussions on the possibility of cooperation on missions to the Moon and to Mars and. earlier in the year, the Chinese National Space Administration (CNSA) and the Russian Federal Space Agency agreed to launch a mission to Mars as early as October 2009, albeit a robotic one. The Sino-Russian mission intends to launch a Chinese satellite to the Martian moon Phobos, where soil samples will be collected and returned to Earth. Whether the mission is realized is perhaps less important than the agreement indicating the two sides have taken a key step forward to working together on a space program. The partnership of China and Russia came as no surprise to veteran Sino-Russian observers. The combination of Russian technology and its long-duration space exploration experience when merged with the Chinese economy clearly make such a pairing a win-win situation. In fact. China's space program can be traced back to the mid-1950s, when it was started with Soviet assistance during a period of strong ties between the two Communist bloc giants. Now. it seems those ties have been renewed, as evidenced by the aforementioned agreement and Russian assistance in the advanced training of China's taikonauls. Already, China has undertaken its third manned spaceflight (Figure 2.3), has completed development and testing on a new extravehicular (EVA) spacesuit and has published plans for a twenty-tonne human-tended space station. Supporting these projects are more than two hundred thousand engineers involved in aerospace research and development work in areas such as propulsion, robotics, space nuclear power and a host of other technologies required lo operate in space, be it in LEO or on the surface of Mars. How far this strategic partnership and cooperation will go in terms of realizing a Sino-Russian manned mission to Mars is uncertain, but Russia's unique scientific capability and experience in long-duration spaceflight together with China's funding has the potential to mark a revolution in manned spaceflight. If that happens, it is possible the centre of gravity for space exploration and a future manned mission to Mars may begin to move from the Atlantic to the Pacific.

Russia can do it—they’ll get international funding

AssociatedPress2002(“MISSION TO MARS BEING PROPOSED BY RUSSIANS”, <http://www.sptimes.ru/index.php?action_id=2&story_id=7602&highlight=escape%20TO%20tea%20big%20blue>) MG

Refusing to be deterred by a string of failures in exploring Mars, space officials proposed an ambitious international project Friday to send a six-person team to the Red Planet around 2015. Russia's space program hopes to work closely with the American agency NASA and the European Space Agency to build two spaceships that would be capable of transporting the crews to Mars, supporting them on the planet for up to two months and then safely bringing them home, said Nikolai Anfimov, head of the Central Research Institute of Machine-Building. The roughly 440-day trip - which would be a milestone in space travel and international space cooperation -is expected to cost about $20 billion, with Russia suggesting it would contribute 30 percent. "It must be an international project," said Vitaly Semyonov, head of the Mars project at the M.V. Keldysha Space Research Center. "No one country could cope with this task alone." Space officials said they are receiving encouraging signs of interest from NASA and European counterparts.

Spending Link

NASA estimates find the cost to be about 600 billion dollars

Easterbrook 01/26/2004an [American](http://en.wikipedia.org/wiki/United_States) writer, lecturer, and a senior editor of [*The New Republic*](http://en.wikipedia.org/wiki/The_New_Republic)

Two centuries ago, Meriwether Lewis and William Clark left St. Louis to explore the new lands acquired in the Louisiana Purchase," George W. Bush said, announcing his desire for a program to send men and women to Mars. "They made that journey in the spirit of discovery ... America has ventured forth into space for the same reasons." Yet there are vital differences between Lewis and Clark's expedition and a Mars mission. First, Lewis and Clark were headed to a place amenable to life; hundreds of thousands of people were already living there. Second, Lewis and Clark were certain to discover places and things of immediate value to the new nation. Third, the Lewis and Clark venture cost next to nothing by today's standards. In 1989 NASA estimated that a people-to-Mars program would cost $400 billion, which inflates to $600 billion today. The Hoover Dam cost $700 million in today's money, meaning that sending people to Mars might cost as much as building about 800 new Hoover Dams. A Mars mission may be the single most expensive nonwartime undertaking in U.S. history.

Landing humans on Mars incredibly expensive

Podnar et al 1/11/11, 1, John Dolan, Ph.D.2, Alberto Elfes, Ph.D.3,  1Program Manager, Robotics Institute Carnegie-Mellon University, October-November 2010, Journal of Cosmology, 4058-4067. , Telesupervised Robotic Systems and the Human Exploration of Mars, Journal of Cosmology, ttp://journalofcosmology.com/Mars121.html,

When we eventually land human beings on Mars, many of the planetary operations will be best carried out by a few humans who spend most of their time telesupervising multiple robots from a "shirtsleeve environment" base as has been described. However, with Mars surface gravity 38% that of Earth, the energy to safely land capable systems, supplies, and the humans that will use them is enormous. Then we must add to this the costs of landing the vehicles and fuel to return the humans to Martian orbit. An estimated cost-per-kilogram to deliver functional equipment to the surface of Mars is a staggering $309,000 (Mitchell 2008-2009). As a result, no matter how symbolically satisfying it would be, it is likely beyond the economic scope of any near-term effort to land human beings on the surface of Mars and to return them safely.

Tradeoff Link (1/2)

NASA’s current funding will not allow for any human exploration

Madrigal, Staff writer for Wired Science, **September** 2009. [Alexis, Humans Aren't Going to Mars – or Anywhere Else – Without More Money, <http://www.wired.com/wiredscience/2009/09/augustinereport/>]

American human space exploration is impossible with NASA’s current budget. The committee tasked with examining NASA’s role in human space flight delivered that finding today while offering a mix of relatively exciting options if the agency can secure an extra $3 billion per year. The report, posted to the Office of Science and Technology Policy website, does not chart any new territory, but it’s unusually clear about the scale and nature of NASA’s problems. The committee said what needed to be said in the interest of a reality-based space program. “You shouldn’t underestimate the impact of the basic statement, which is that the path [NASA] is going on is going nowhere,” said David Mindell, a science and technology historian at MIT who lead a different report on NASA's future last year. “It’s an utter rejection of the Bush plan because it’s unfundable, unbuildable and dangerous. ” The Augustine committee, as it’s known because of its head, Norm Augustine, was tasked in May with delivering the Obama administration options for human space exploration. Industry watchers saw the committee as a way to rethink NASA’s Constellation program, which promised to return Americans to the moon en route to Mars. Over the past couple of years, two things have become increasingly clear: NASA’s funding for human exploration didn’t match its goals; and the gap between the shuttle’s retirement (originally slated for 2010) and Constellation being ready to shoulder the load will be far longer than the two years originally planned. While reports like Mindell’s had pointed out some of these problems, which were bandied about within the aerospace community, the new summary report is a wake-up call delivered to the very highest levels of government that NASA needs new direction and more money. “The Committee finds that no plan compatible with the FY 2010 budget profile permits human exploration to continue in any meaningful way,” the committee wrote. On the issue of the gap, many had been holding fast to the notion that it might be shortened with minor variations or small-scale changes in the program. The Committee did not agree. “Under current conditions, the gap in U.S. ability to launch astronauts into space will stretch to at least seven years,” they wrote. “The Committee did not identify any credible approach employing new capabilities that could shorten the gap to less than six years.” Only continuing to send the shuttle into orbit for years after its intended retirement could close the gap. But that could also take valuable funds away from new technology development or exploration. Though the committee offered a series of options for future exploration, including attempting to go directly to Mars and going to the moon on the way to Mars, they were clearly most excited about a plan they termed the “Flexible Path.” It would focus on humans flying around space farther from Earth but without landing on Mars or the moon. “The Flexible Path represents a different type of exploration strategy. We would learn how to live and work in space, to visit small bodies, and to work with robotic probes on the planetary surface,” they wrote. “It would provide the public and other stakeholders with a series of interesting ‘firsts’ to keep them engaged and supportive. Most important, because the path is flexible, it would allow many different options as exploration progresses, including a return to the moon’s surface, or a continuation to the surface of Mars.” Commercial space advocates are pleased with the report, too. It provides companies like SpaceX with major backing for their efforts to completely take over low-earth orbit launches. “Based on not just this, but what the Augustine commission members were saying in their public hearings and other public statements that the committee members were making, the message was coming across loud and clear that now is the time to hand over human spaceflight commercially,” said John Gedmark, executive director of the Commercial Spaceflight Federation. “But obviously from our perspective, it’s great to see this come out in print.” Because the report is a summary of a longer version that will be delivered later this month, the Office of Science and Technology Policy and NASA both declined to comment on the report. The White House reiterated President Obama’s support for space exploration, but also punted until the full report is out. “The president has on numerous occasions confirmed his commitment to human space exploration, and the goal of ensuring that the nation is on a vigorous and sustainable path to achieving our boldest aspirations in space,” Nicholas Shapiro, a White House spokesman, wrote in an e-mail to Wired.com. “Once we receive the final report, we will release it to the public and move swiftly to review the options put forth by the Committee.” That looks likely to happen during the first week of October at a NASA Executive Summit.

Tradeoff Link (2/2)

Mars Funding takes money out of close to home issues and other space issues

Stratford, CEO and founder of MarsDrive. His writing is focused on finding solutions to commercial space development with a special focus on how Mars can fit within this context, **October 4th,** 2010, [Frank, “The relevance of Mars”, <http://www.thespacereview.com/article/1705/1>]

As an exploration target, Mars does retain a high position of importance for scientists of many disciplines. But if we take this question of human exploration of Mars out of this context, such programs do not make sense in a world reeling from one financial crisis to another. That is why whenever the topic of human Mars exploration is raised it is instantly opposed by a variety of critics. As government and private budgets tighten, exploration budgets are also squeezed hard, and it is often for the most challenging programs like humans to Mars that R&D dollars contract more quickly than in other, closer to home scientific priorities, such as ocean or atmospheric studies on Earth. There is also another context against which Mars exploration loses ground, and that is when it is placed against the development of cheap access to space. Mars exploration is often viewed as an expensive rival program that would, in the opinion of commercial space advocates, simply sidetrack the more important goal of developing cheap space access. However, this view is based on old assumptions that look backwards instead of forwards. The only off-world planetary body humans have explored is our Moon, and ever since that program human plans for Mars have suffered by being judged within the same parameters and constraints, good and bad points together. Many in the NewSpace community feel that a human Mars mission would just be another Apollo-style government program that spends billions on sending a select few to Mars with conventional rockets, return some rock samples, and be shut down as new administrations came and went. Cheap space access is the holy grail of all who are interested in space, including those who want to see human missions to Mars. But there are serious questions we need to find solutions for before this sort of R&D can succeed.